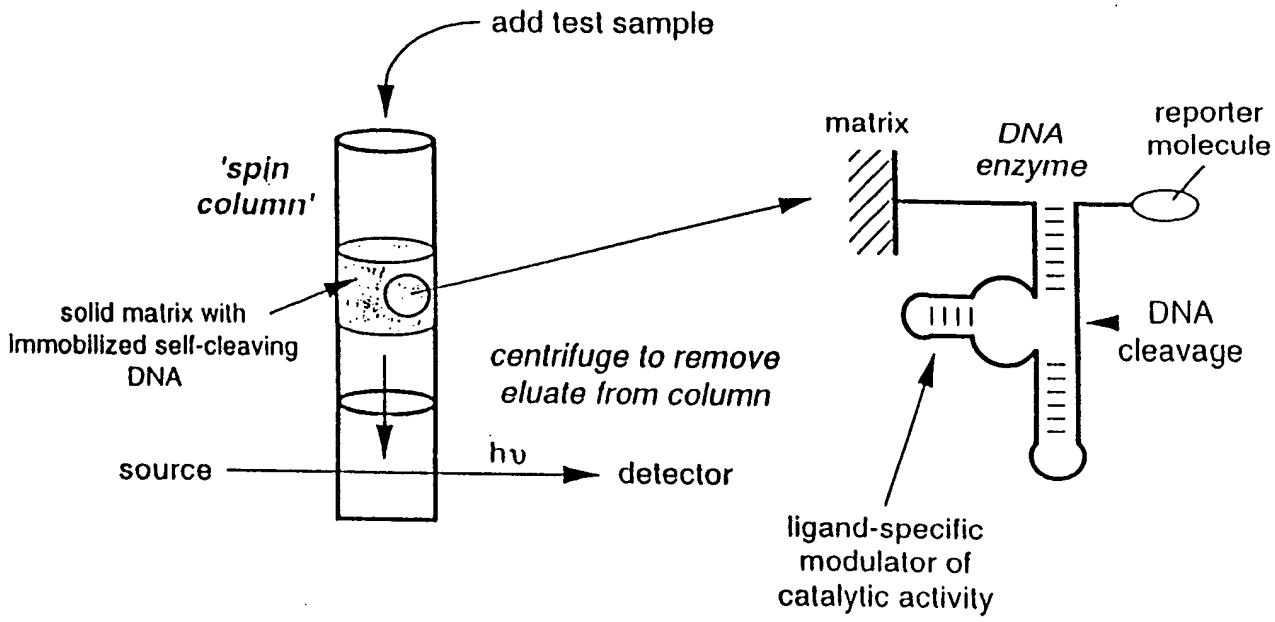



Figure 1

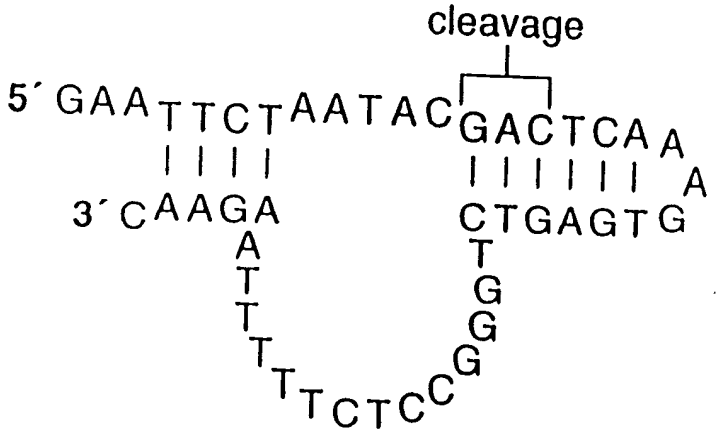



Figure 2

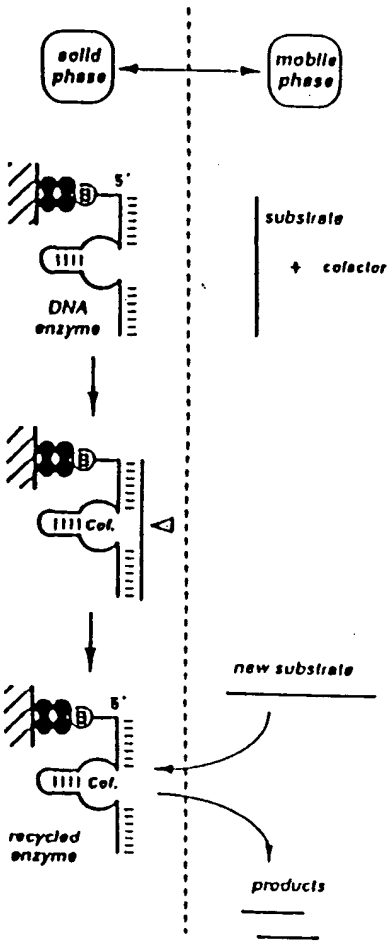



Figure 3A

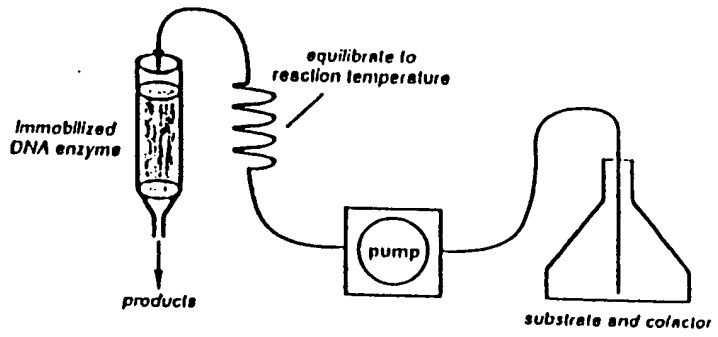



Figure 3B

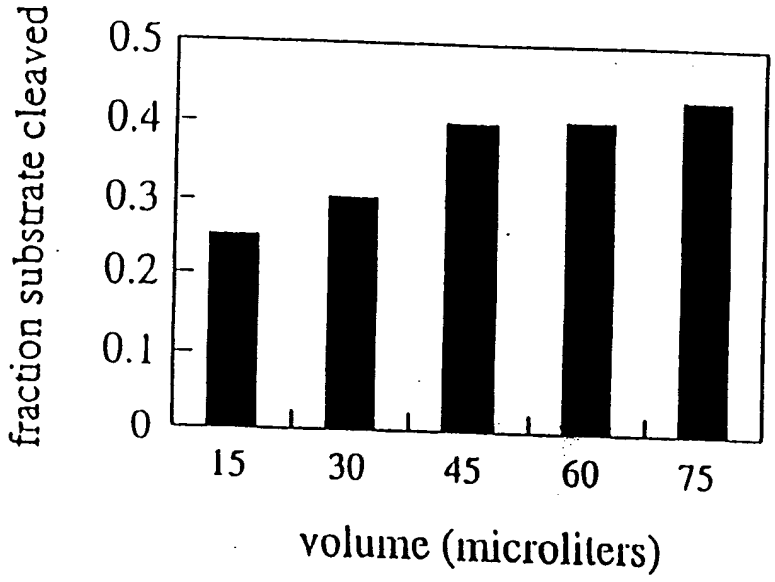



Figure 4

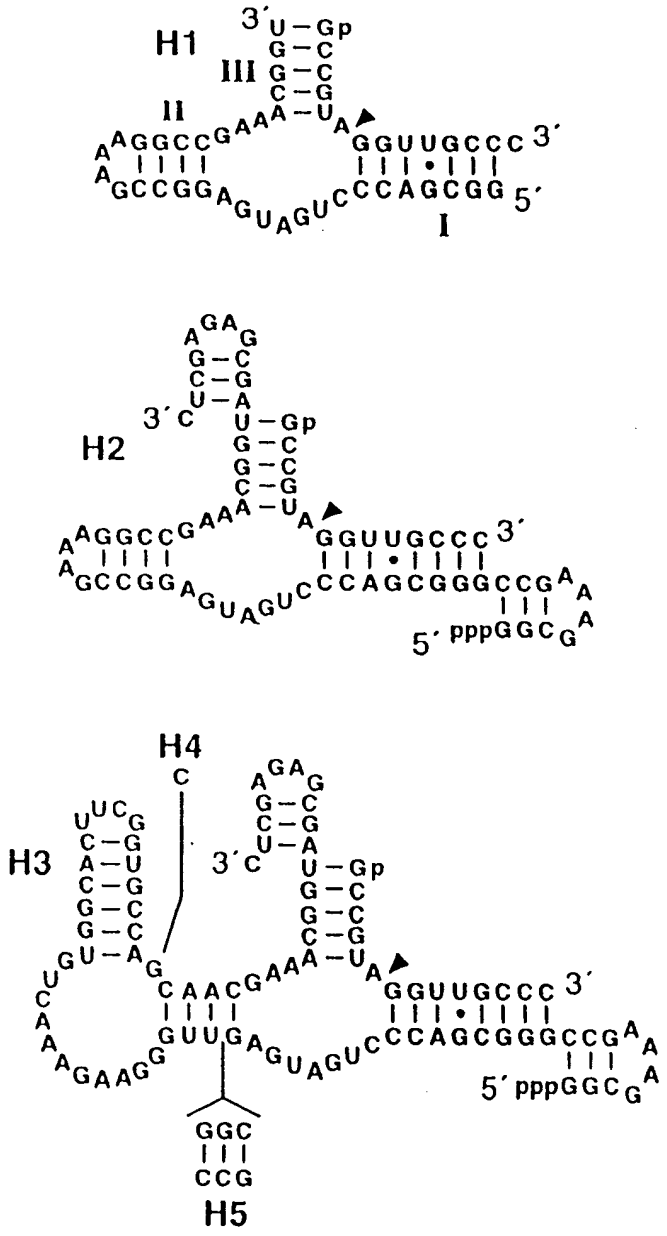



Figure 5

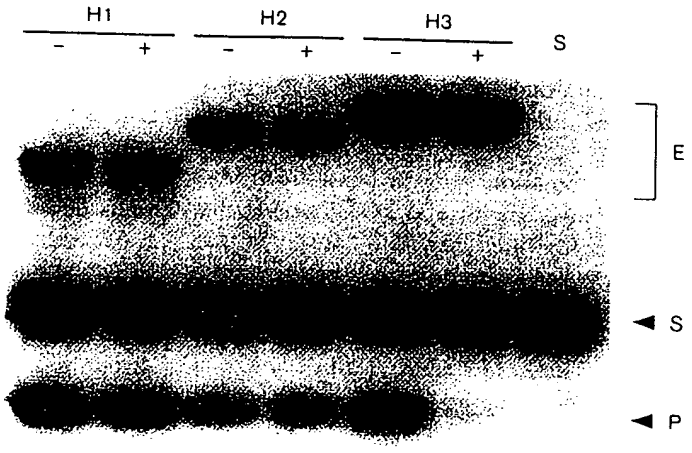



Figure 6A

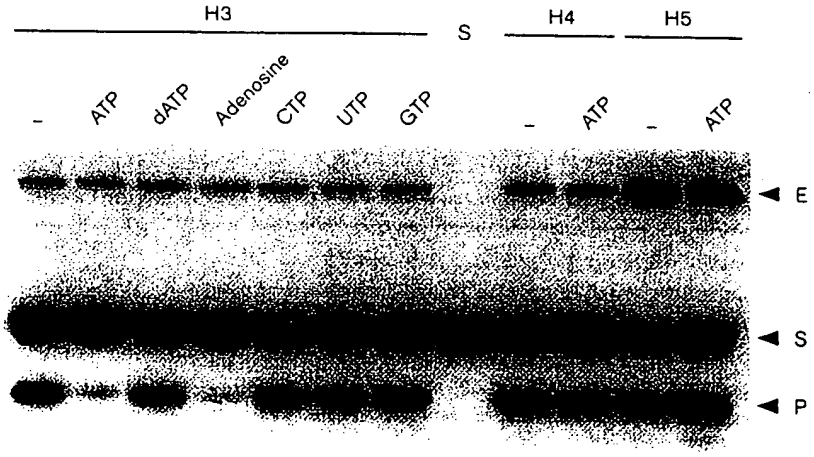



Figure 6B

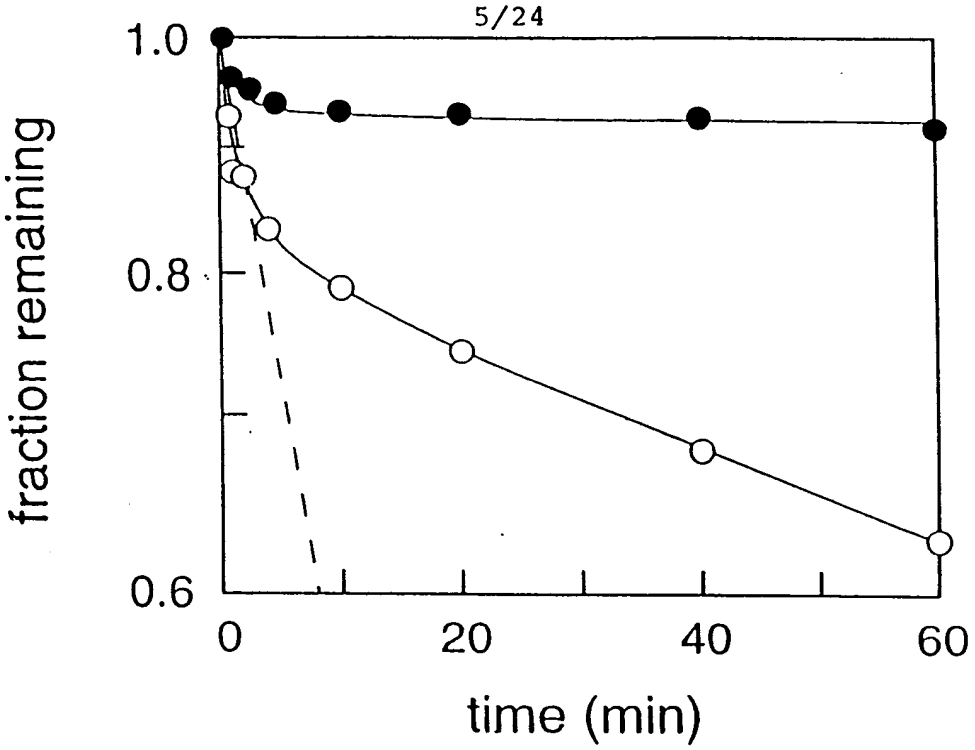



Figure 7A

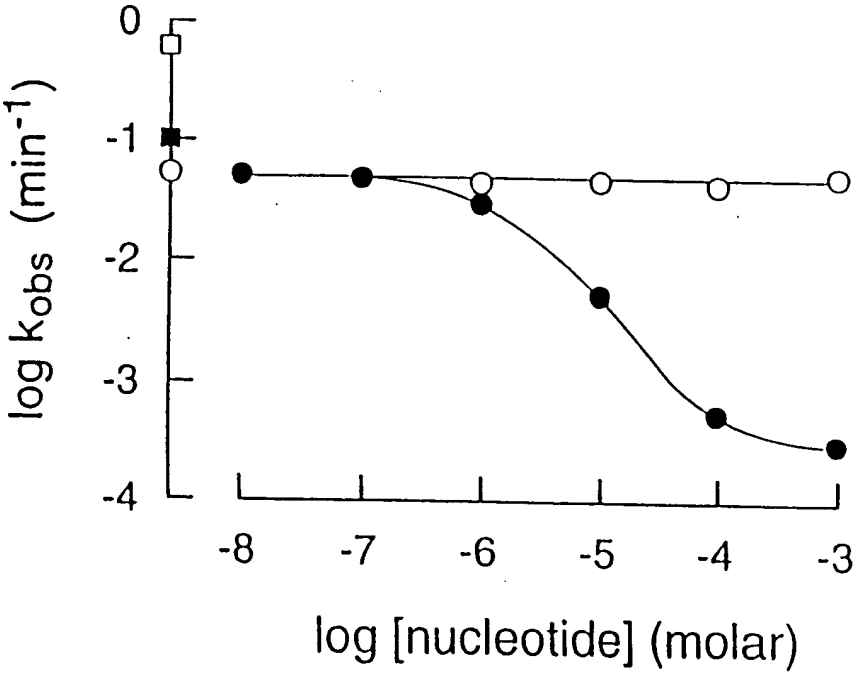



Figure 7B

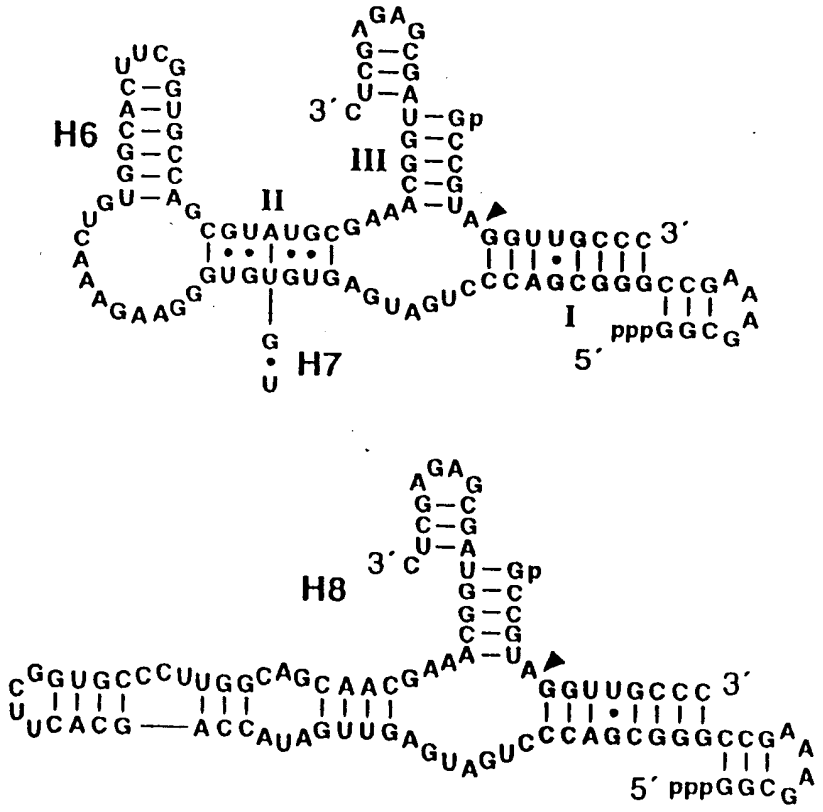



Figure 8A

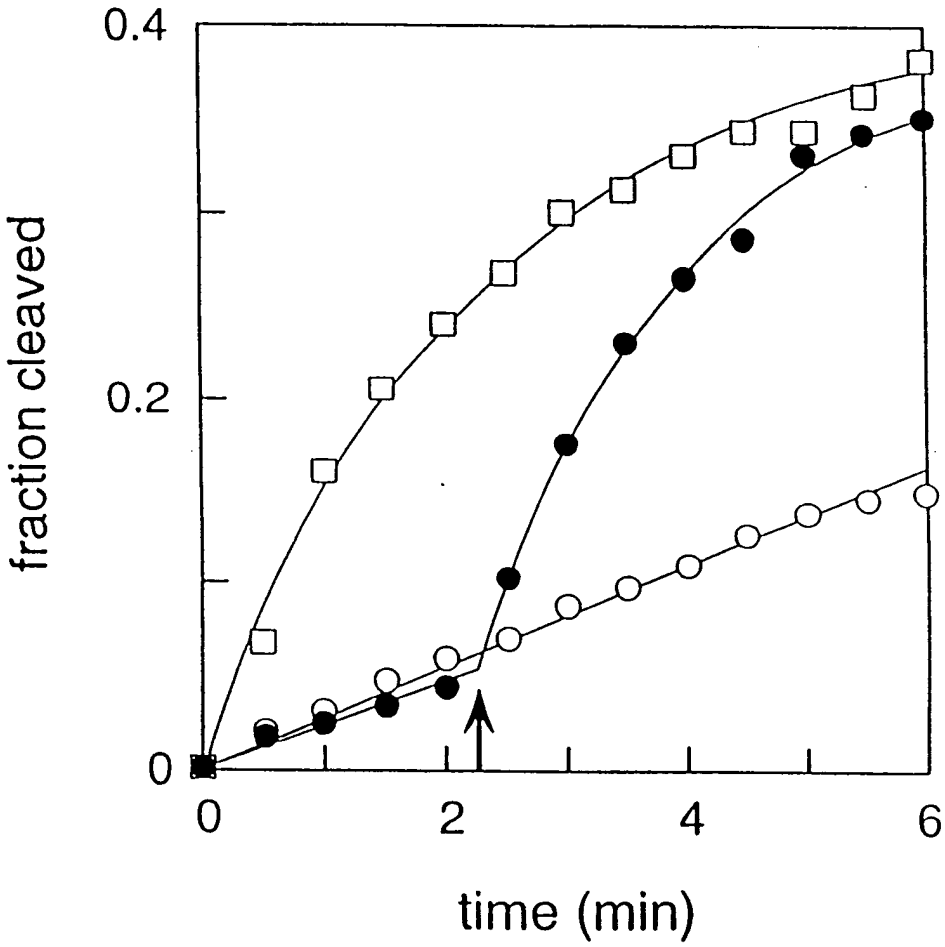



**Figure 8B**

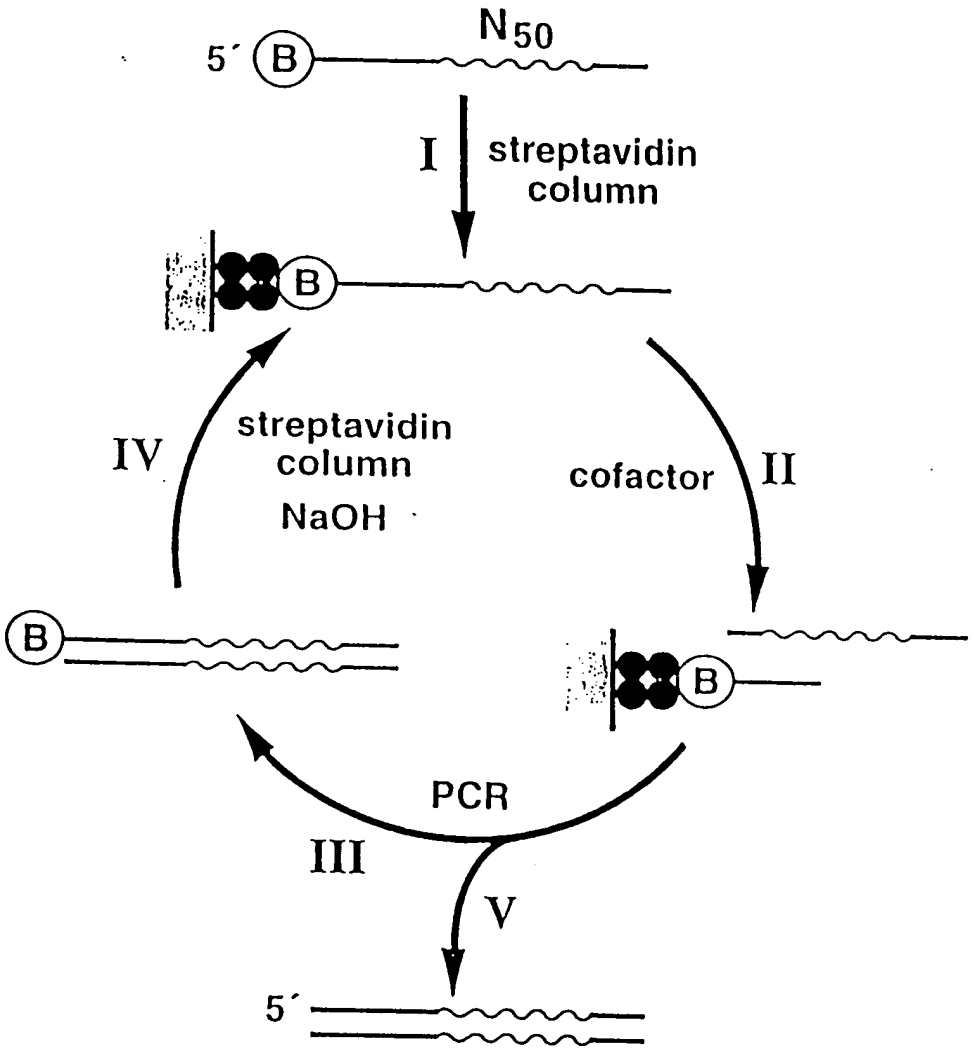

5´
B
N50
I
streptavidin
column
B
IV
streptavidin
column
NaOH
cofactor
II
B
B
PCR
III
V
5´

Figure 9A

Figure 9B

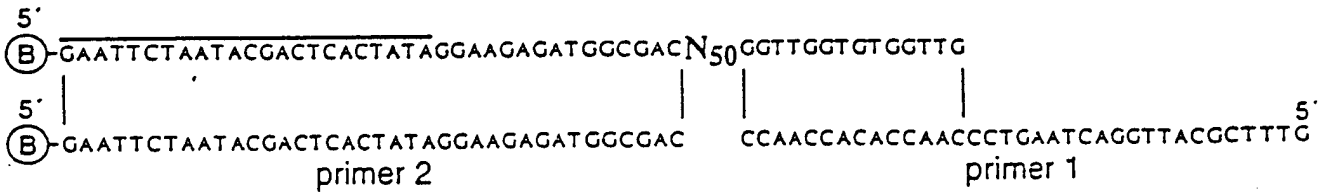
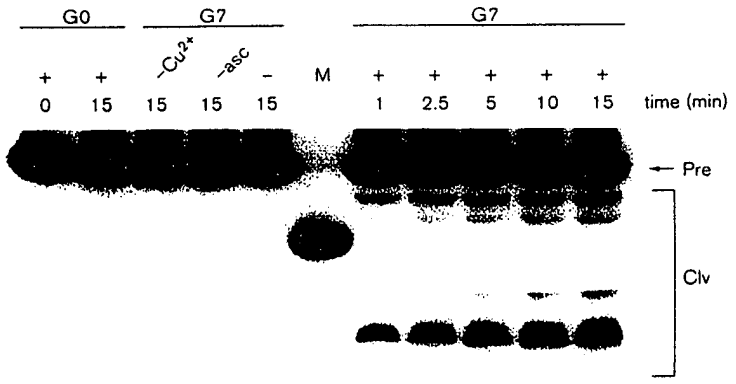
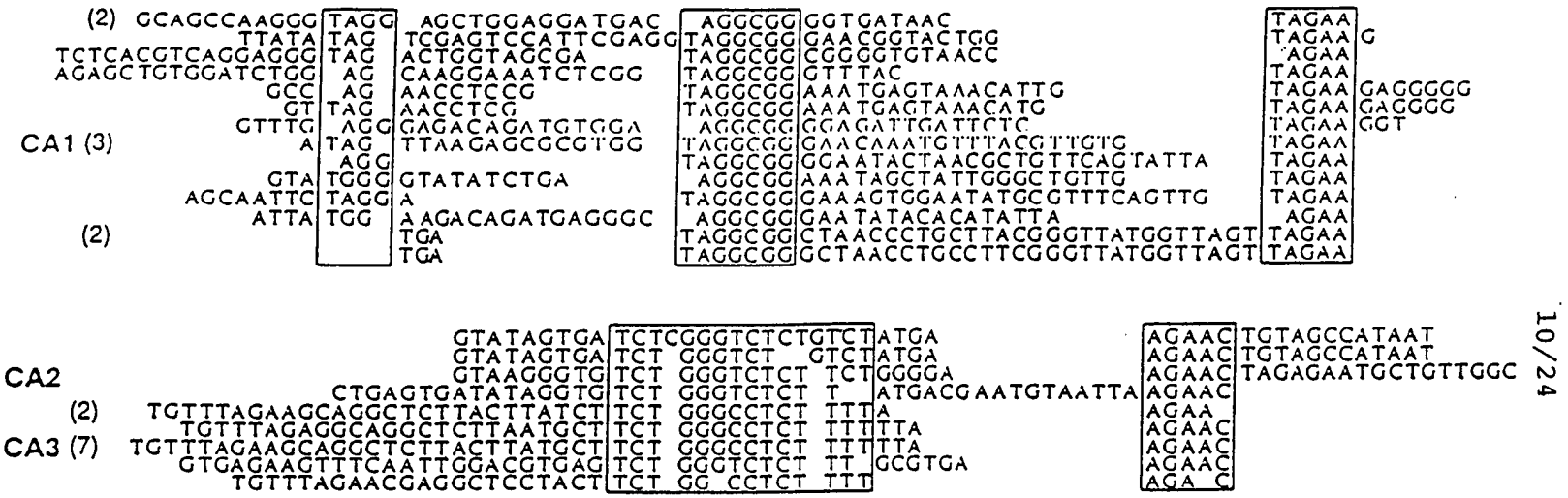





Figure 9C




(2) GCAGCCAAGGG TAGG AGCTGGAGGATGAC AGGCGG GGTGATAAC TAGAA
TTATA TAG TCGAGTCCATTCGAGG TAGGCGG GAACGGTACTGG TAGAA G
TCTCACGTCAGGAGGG TAG ACTGGTAGCGA TAGGCGG CGGGGTGTAACC AGAA
AGAGCTGTGGATCTGG AG CAAGGAAATCTCGG TAGGCGG GTTTAC TAGAA
GCC AG AACCTCCG TAGGCGG AAATGAGTAAACATTG TAGAA GAGGGGG
GT TAG AACCTCG TAGGCGG AAATGAGTAAACATG TAGAA GAGGGG
GTTTG AGG GAGACAGATGTGGA AGGCGG GGAGATTGATTCTC TAGAA GGT
CA1 (3) A TAG TTAAGAGCGCGTGG TAGGCGG GAACAAATGTTTACGTTGTG TAGAA
AGG TAGGCGG GGAATACTAACGCTGTTCAGTATTA TAGAA
GTA TGGG GTATATCTGA AGGCGG AAATAGCTATTGGGCTGTTG TAGAA
AGCAATTC TAGG A TAGGCGG GAAAGTGGAATATGCGTTTCAGTTG TAGAA
ATTA TGG AAGACAGATGAGGGC AGGCGG GAATATACACATATTA AGAA
(2) TGA TAGGCGG CTAACCCTGCTTACGGGTTATGGTTAGT TAGAA
TGA TAGGCGG GCTAACCTGCCTTCGGGTTATGGTTAGT TAGAA
GTATAGTGA TCTCGGGTCTCTGTCT ATGA AGAAC TGTAGCCATAAT
GTATAGTGA TCT GGGTCT GTCT ATGA AGAAC TGTAGCCATAAT
CA2 GTAAGGGTG TCT GGGTCTCT TCT GGGGA AGAAC TAGAGAATGCTGTTGGC
CTGAGTGATATAGGTG TCT GGGTCTCT T ATGACGAATGTAATTA AGAAC
(2) TGTTTAGAAGCAGGCTCTTACTTATCT TCT GGGCCTCT TTT A AGAA
TGTTTAGAGGCAGGCTCTTAATGCT TCT GGGCCTCT TTT TTA AGAAC
CA3 (7) TGTTTAGAAGCAGGCTCTTACTTATGCT TCT GGGCCTCT TTT TTA AGAAC
GTGAGAAGTTTCAATTGGACGTGAG TCT GGGTCTCT TT GCGTGA AGAAC
TGTTTAGAACGAGGCTCCTACT TCT GG CCTCT TTT AGA C

10/24

Figure 10A

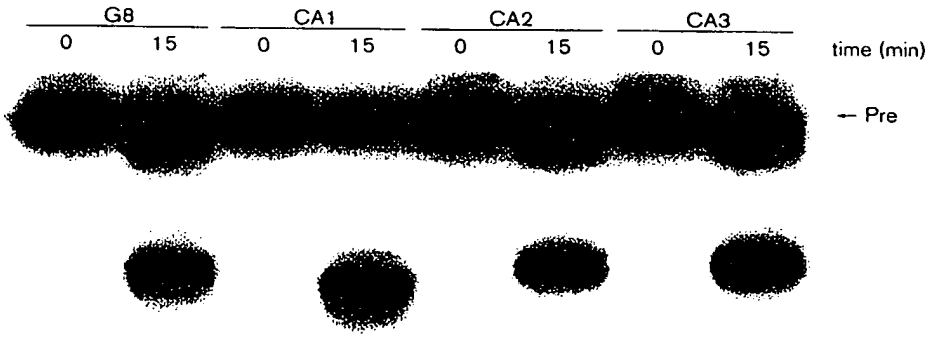



Figure 10B

Figure 11

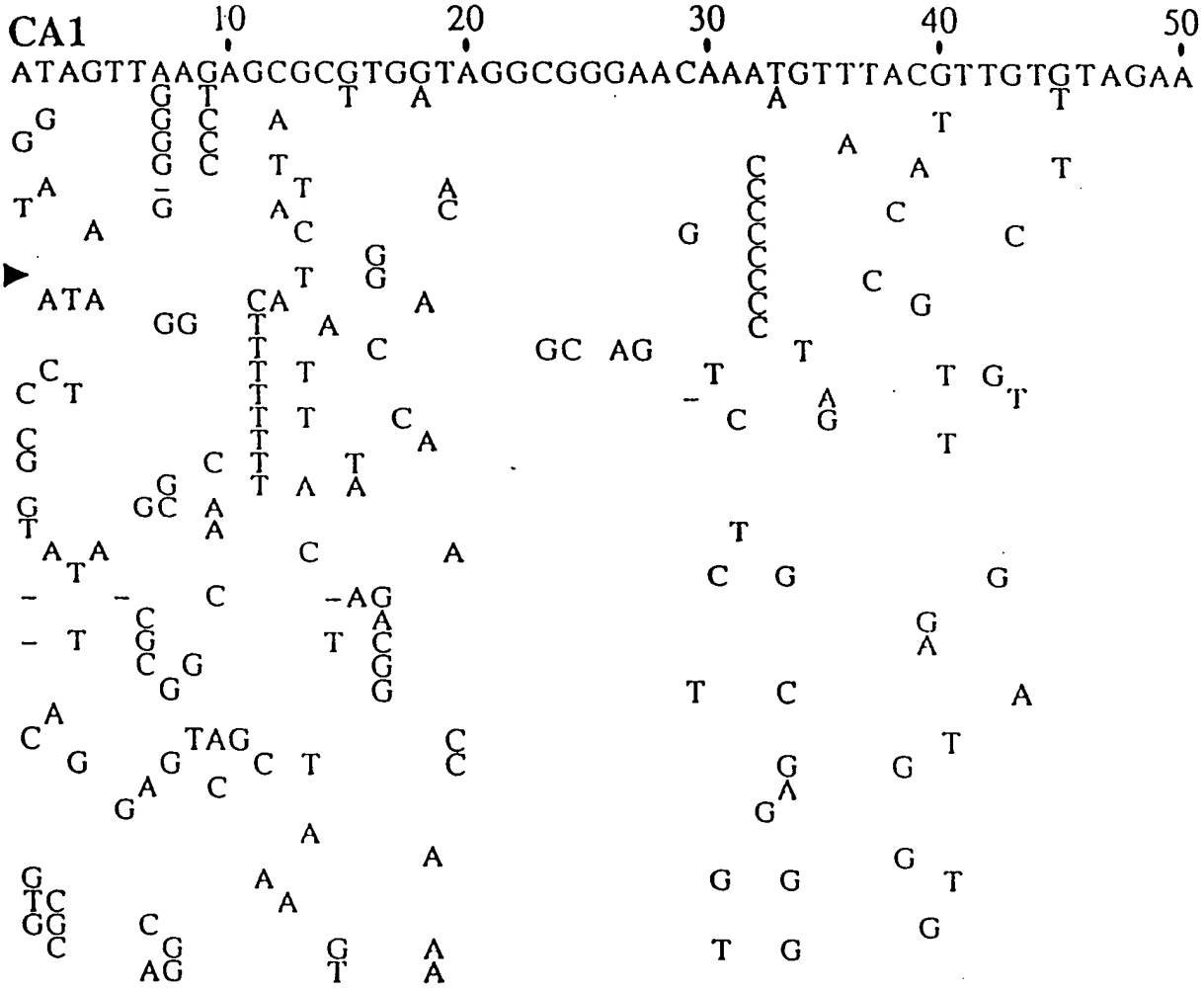

CA1
10
20
30
40
50
ATAGTTAAGAGCGCGTGGTAGGCGGGAACAAATGTTTACGTTGTGTAGAA

Figure 12A

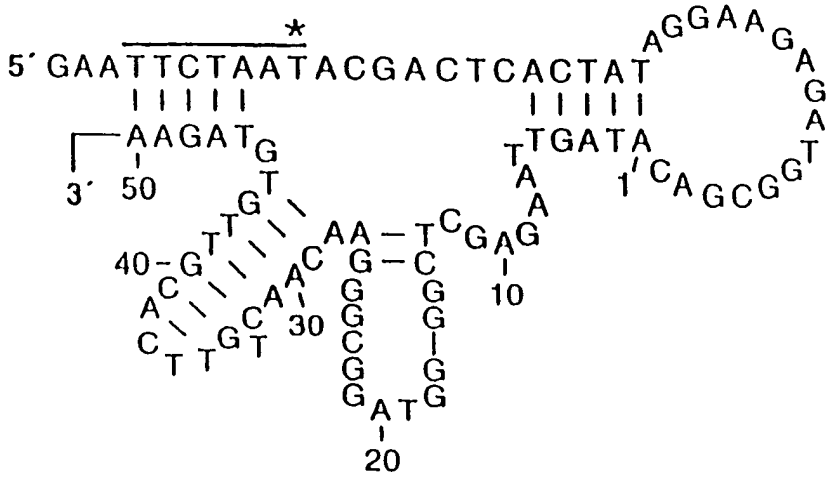



Figure 12B

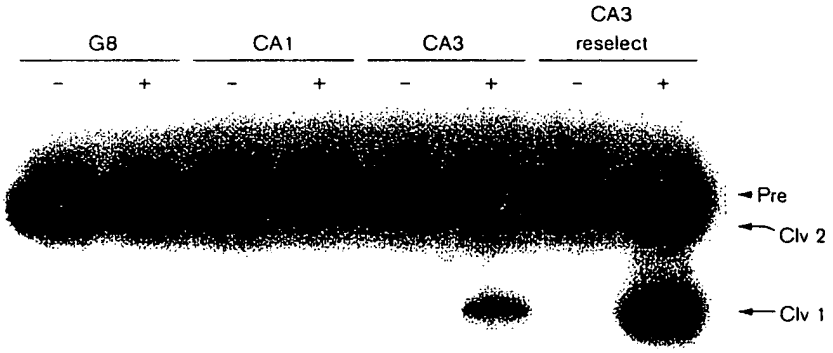



Figure 13A

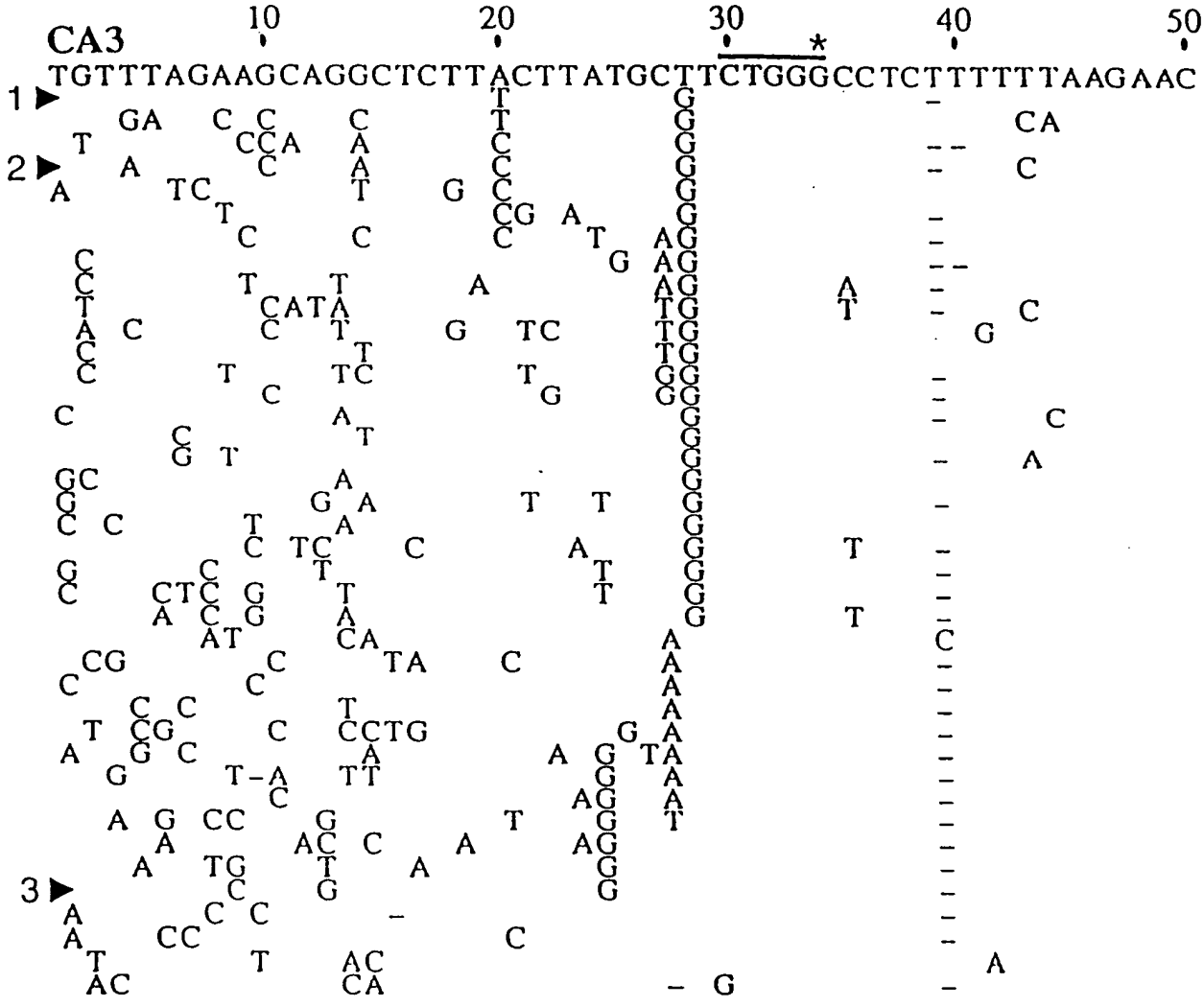

CA3
10
20
30
40
50
TGTTTAGAAGCAGGCTCTTACTTATGCTTCTGGGCCTCTTTTTTAAGAAC
1
2
3

Figure 13B

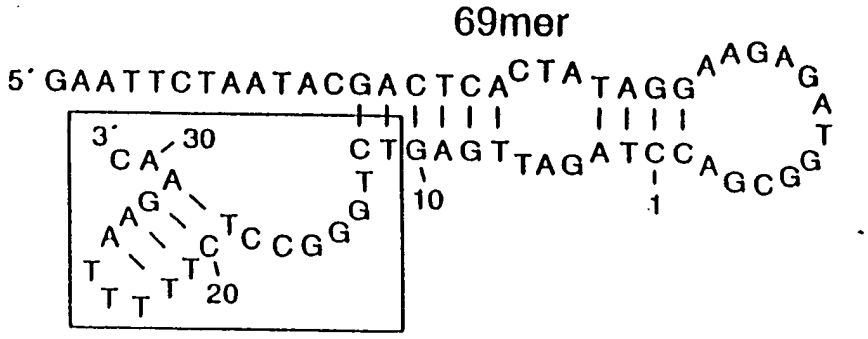



**Figure 14A**

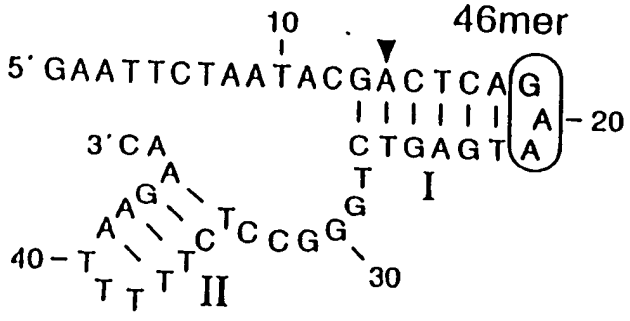



**Figure 14B**

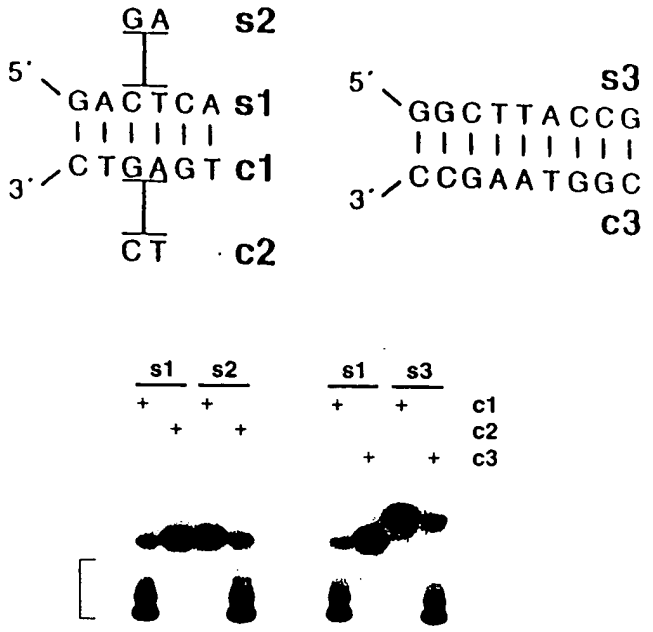
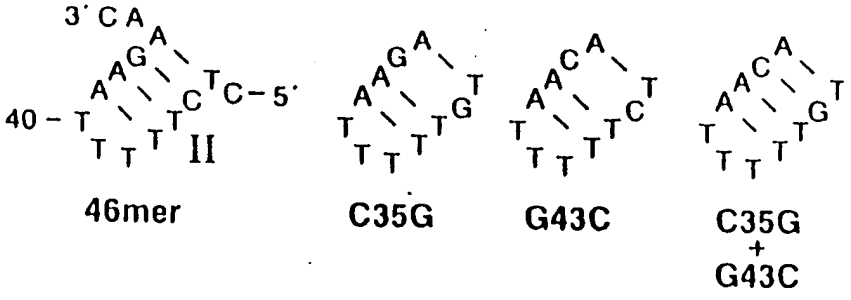



Figure 15A



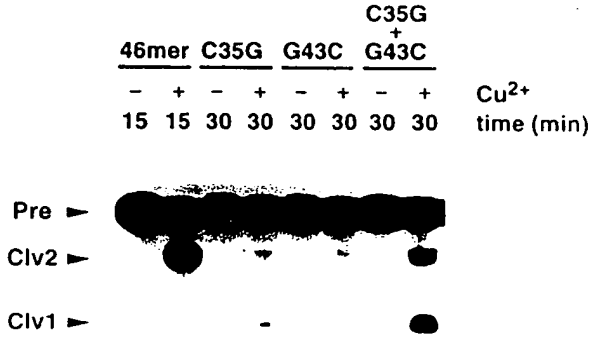




Figure 15B

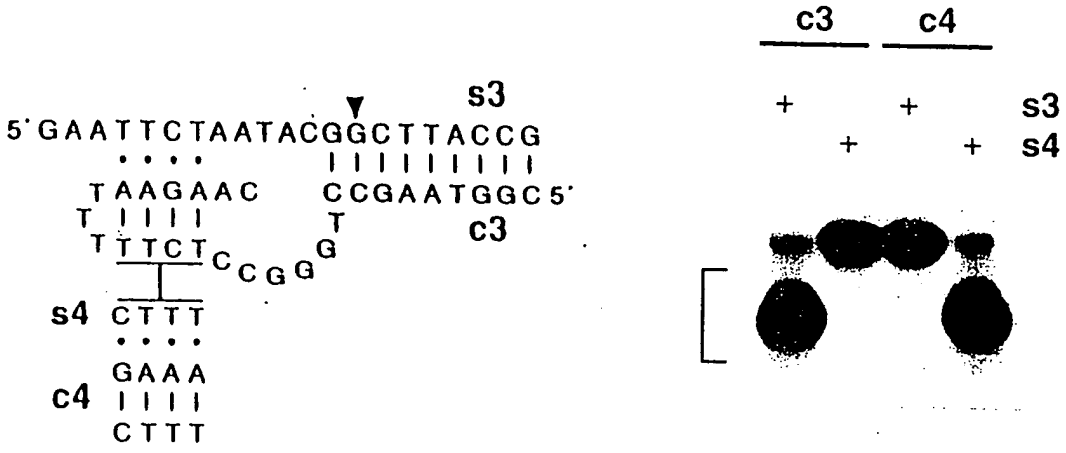



Figure16

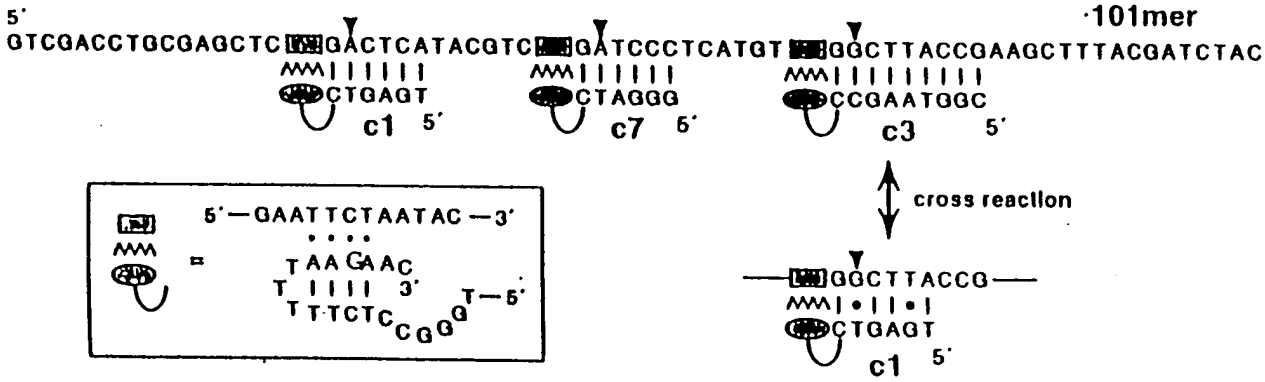



Figure 17A

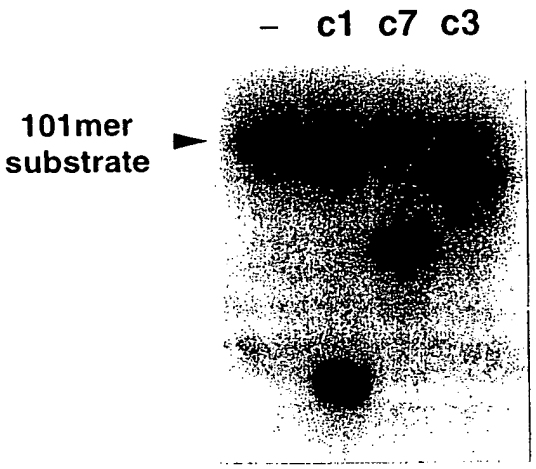



Figure 17B

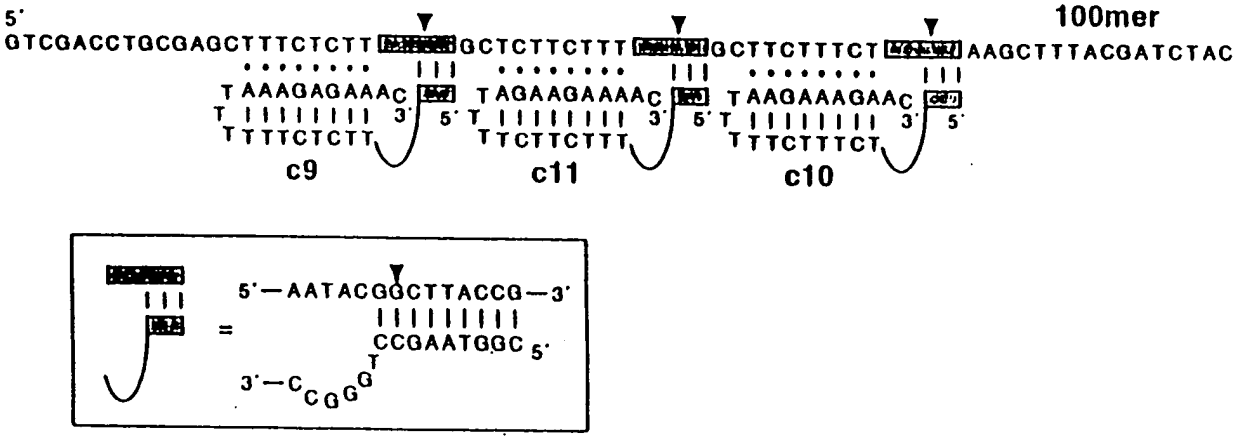



Figure 17C

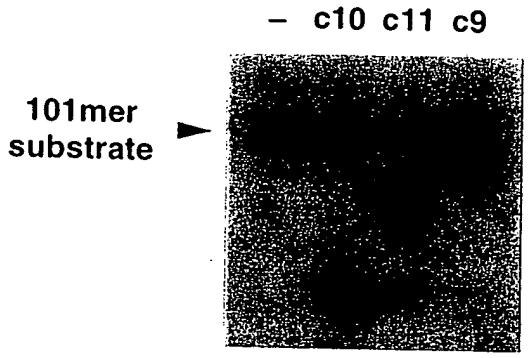



Figure 17D

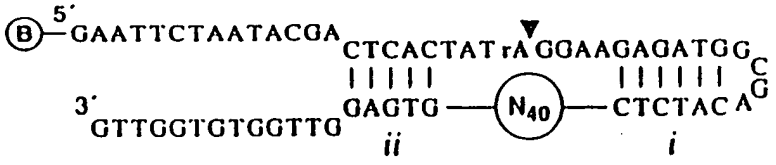



Figure 18A

| class | | catalytic activity: HEPES | catalytic activity: histidine |
|---|---|---|---|
| I | (7) GTTGGGTCAC GGTATGGGGT CACTCGACGA AAATGCCGG | + | + |
| II | (6) AGGATTGGTT CTGGGTGGGT AGGAAGTTAG TGTGAGCCG | – | + |
| III | (4) CGGGTCGAGG TGGGGAAAAC AGGCAAGGCT GTTCAGGATG | + | + |
| IV | (3) AGGATTAAGC CGAATTCCAG CACACTGGCG GCCGCTTCAC | + | + |

Figure 18B

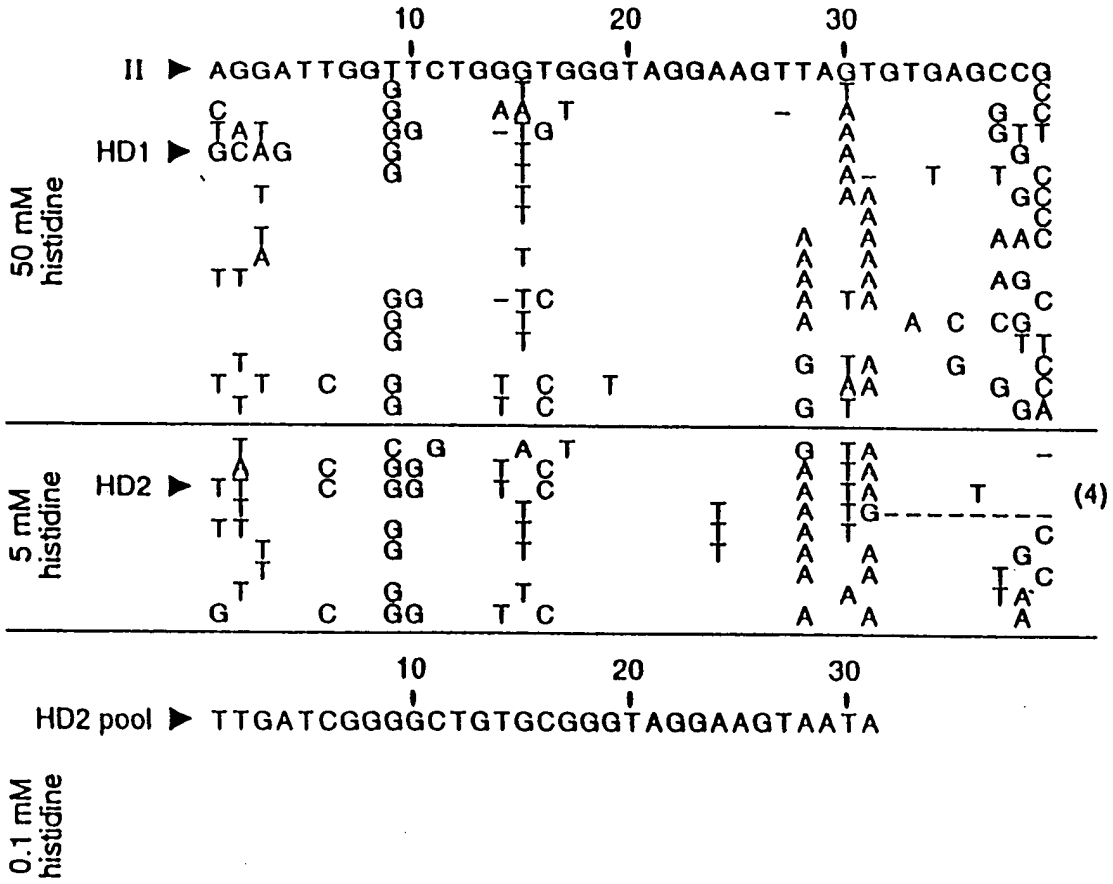



Figure 19A

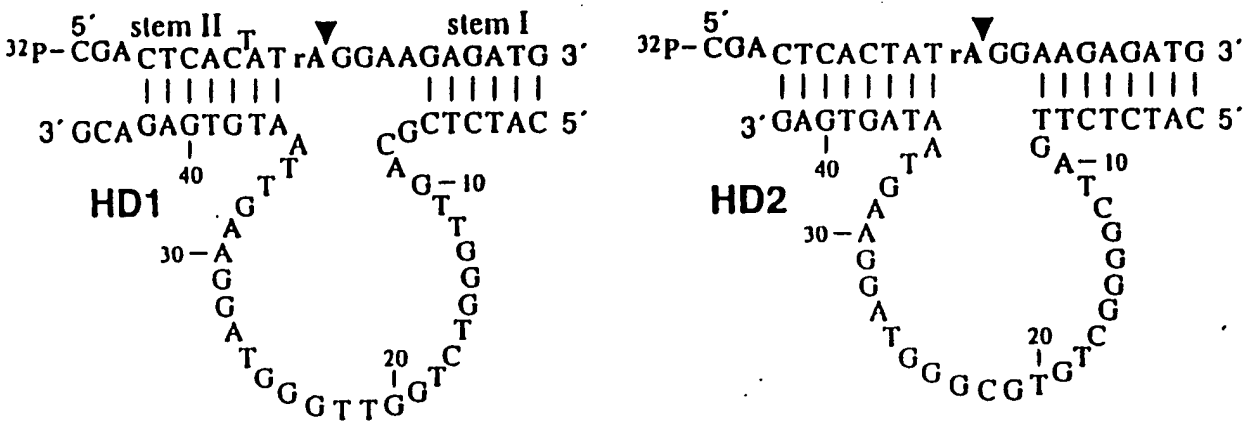



Figure 19B

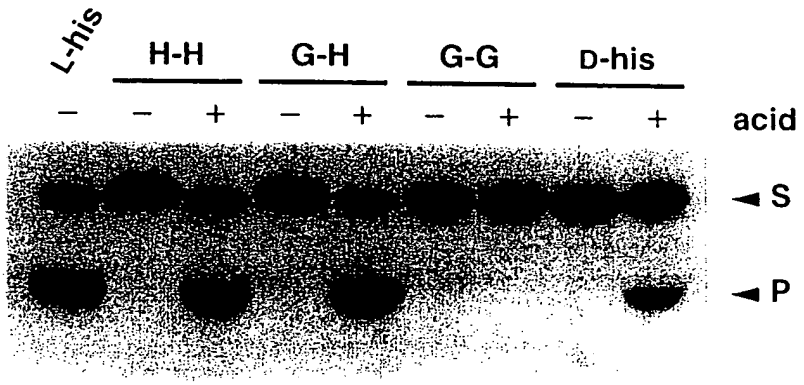
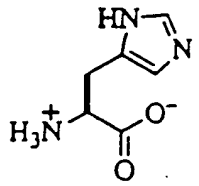
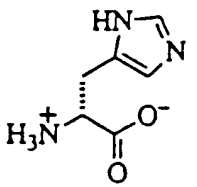


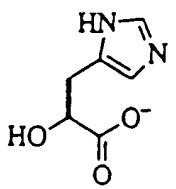

Figure 20A



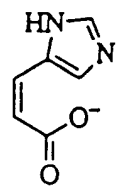
L-histidine



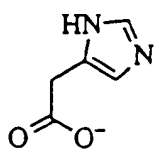
D-histidine



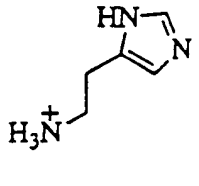
L-β-imidazole-lactic acid



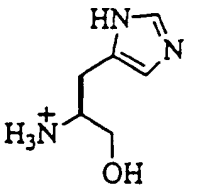
urocanic acid



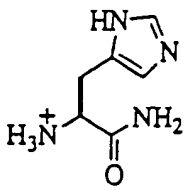
imidazole-4-acetic acid



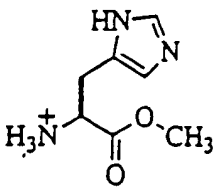
histamine



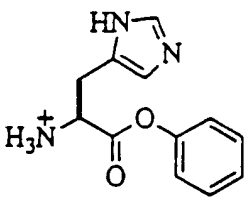
L-histidinol



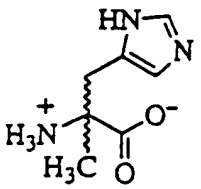
L-histidinamide



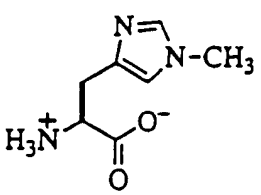
L-histidine methyl ester



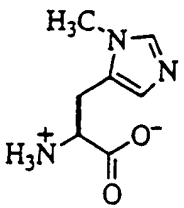
L-histidine benzyl ester



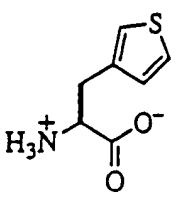
α-methyl-DL-histidine



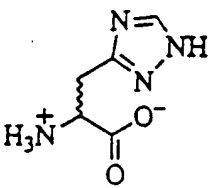
1-methyl-L-histidine



3-methyl-L-histidine



β-2-thienyl-L-alanine



DL-1′,2′,4′-triazolyl-3-alanine

Figure 20B

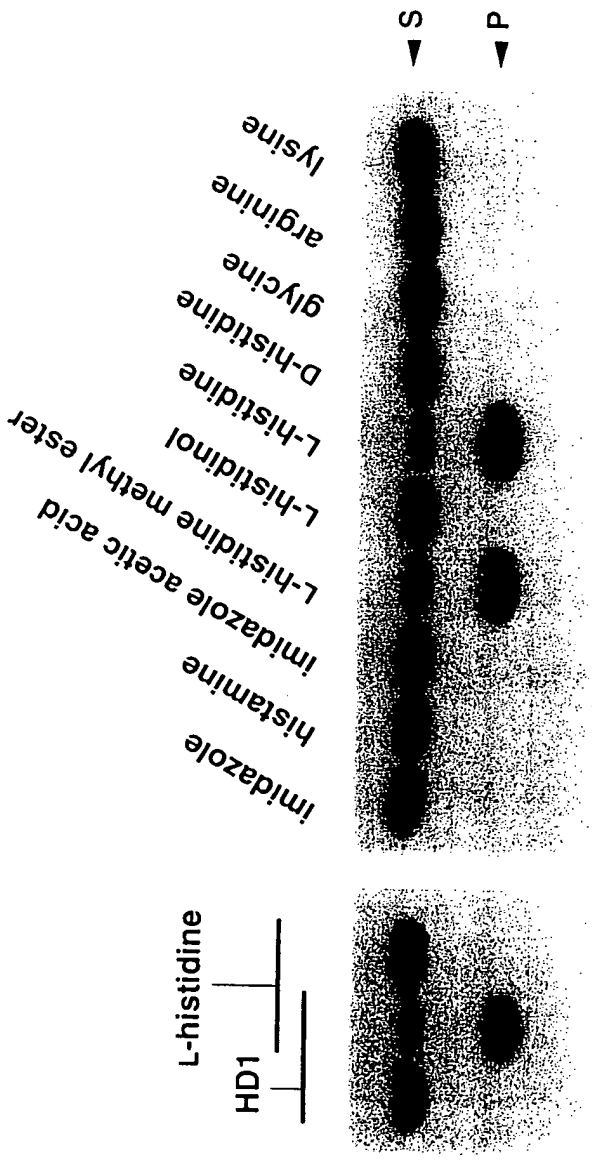

S
P
imidazole
histamine
imidazole acetic acid
L-histidine methyl ester
L-histidinol
L-histidine
D-histidine
glycine
arginine
lysine
L-histidine
HD1

Figure 20C

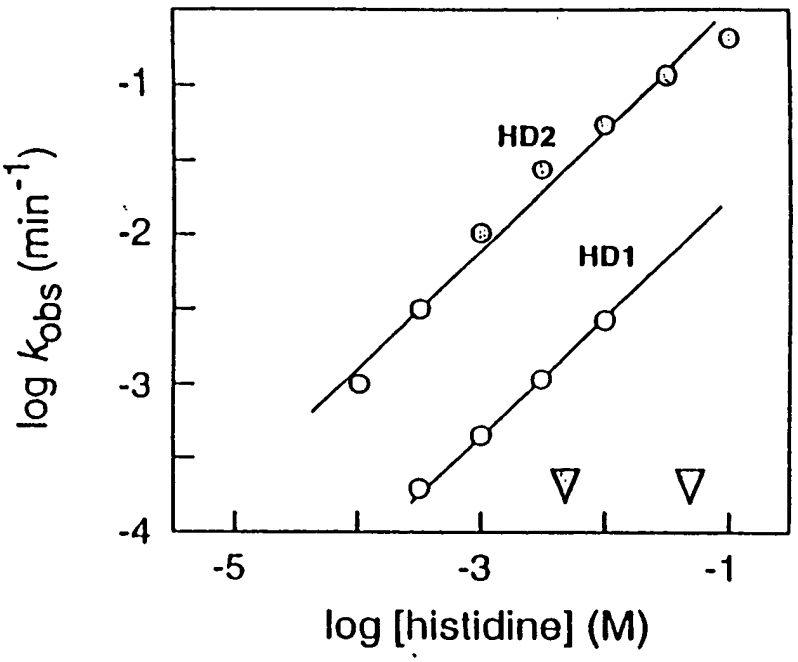



Figure 21A

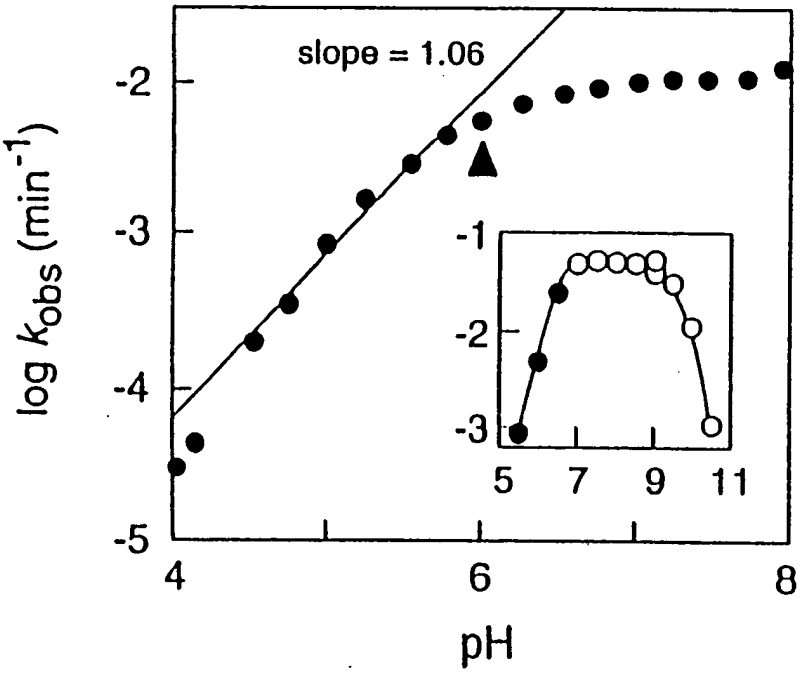



Figure 21B